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1. Introduction¹

This special issue is based on papers and discussions at the first global workshop “**Global and Regional Research on Sustainable Production and Consumption Systems: Achievements, Challenges, and Dialogues**”, organized in Rio de Janeiro by the Global Research Forum on Sustainable Production and Consumption, GRF-SPaC, June 13-15, 2012 (Lorek *et al.*, 2013). The year 2012 was the 20th anniversary of the UN Conference on Environment and Development, more familiarly known as the “Earth Summit.” In June of that year world leaders from governments, business and civil society met once again in Rio de Janeiro (the UN Conference on Sustainable Development or “Rio+20”) to reflect on progress with regard to past and current commitments to the aims of sustainable development articulated in 1992. Given the general acknowledgement of an “implementation gap” amid “worsening trends”, despite increase in public awareness and improvements in eco-efficiency, the need to better understand and promote sustainable production and consumption systems as well as the obstacles to this transition has become increasingly urgent.

The **Global Research Forum on Sustainable Production and Consumption (GRF-SPaC)** is a new initiative bringing together organizations and individuals from various regions of the world engaged in research and its applications in the transition to sustainable production/consumption (SPaC) systems. During the Rio+20 conference, June 2012, research organizations, universities, practitioners and think tanks, supported by the Brazilian Ministry of the Environment and other partner organizations, helped mount the official launch of GRF-SPaC in Rio de Janeiro. The launch involved several events, most notably a three-day workshop featuring about 90 researchers and practitioners from various regions of the world. The workshop, held at the Escola Superior de Propaganda e Marketing (ESPM), had a focus on sustainable consumption and production research as well as its applications in practice.

This GRF-SPaC initiative builds on a 20+ year research tradition involving numerous researchers, institutes, and networks around the world, and on the many efforts and experiences applying research findings to policy, civil society activities, and business. The three-day workshop in Rio represented the official launch of the GRF initiative. The workshop aimed to achieve the following seven objectives:

- To identify some of the most critical research questions to be investigated in the next five to ten years, from the perspective of researchers as well as practitioners, educators, and policy makers.
- To review and assess the current state of knowledge on SCP around the globe, particularly in different regions.
- To create a bridge between researchers and practitioners from different regions around the world in a creative process of exchange of information, knowledge, and perspectives on sustainable production and consumption.
- To review the state-of-the-art concerning how change is achieved and what mechanisms are effective to achieve a switch to sustainable consumption and production patterns.
- To explore how to effectively communicate SCP research and findings to users and the general public, especially in different global regions.
- To formulate and send a clear message on the role of SCP research and practice as it applies to the global policy debate at the UN Rio+20 conference.
- To examine and encourage research and efforts addressing well-being, inequality and alternative concepts and measures of prosperity, such as the Millennium Consumption Goals.

¹ This section is based on the Introduction of Lorek *et al.* (2013)

Workshop outcomes and plans were also discussed in a number of public panels in conjunction with Rio+20 activities, including the Forum on Science, Technology and Innovation for Sustainable Development (International Council for Science), and the Brazilian Ministry Dialogue on Sustainable Consumption and Production.

At the time of writing (Sept 2013) GRF-SPaC has established itself as the global network of researchers and practitioners in the field of SPaC. It has organized a number of follow-up workshops and conference sessions in various places around the world (Beijing in 2012, Wuppertal, Stellenbosch, Davos, and Montreal in 2013). It has established a listserve and a website; conducted surveys among participants, reviewed existing SPaC literature, and is presently in the process of organizing its next global conference from June 8-11, 2014, in Shanghai. It has also started a research and policy project to develop frameworks for achieving absolute REDUCTIONS (Reducing Environmental Degradation & Unsustainable Consumption Trends & Impacts On Nature & Society). It closely collaborates with networks and institutions around the globe, like SCORAI in North America and Europe, and IGES in Japan.

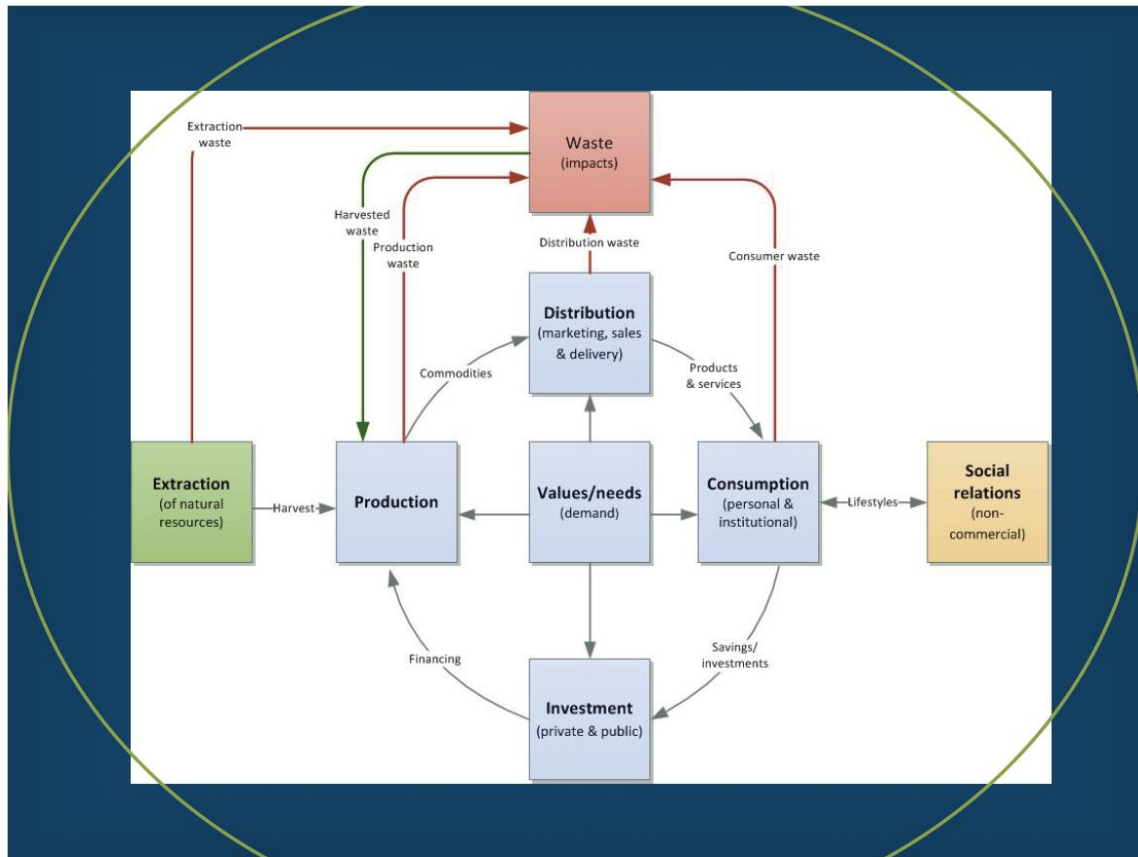
2. Brief overview of SPaC and adjacent research areas

2.1 On the Scope of SCP Research

No full agreement exists among scholars about what constitutes the SPaC research field. A distinction needs to be made between research on *present* (often unsustainable) production and consumption patterns and practices, and studies reflecting the *aspiration* of SPaC. Another distinction is between *individual* production and consumption practices and the *collective* act of production and consumption; which is associated with the cultural notion of a consumer society and consumerist lifestyles. A further distinction can be made between *material* aspects of SPaC (as often expressed in Life Cycle Assessments and Materials Flow analyses); *economic* aspects such as transactions between buyers and sellers as well as investments and the economy as a whole; and *cultural* notions at the individual level (norms and habits) and the collective level (fashion, consumerist life styles). Next to static analyses (such as the LCA of a product), dynamic analyses of change processes exist, such as the frameworks of socio-technical transitions; grassroots innovations; and social movements. Change process can be analyzed through the lens of power relationships between elements of the incumbent system and actors who want to change the system. Finally scholars conceptualize production and consumption as a complex system; and analyze the complexities of changing such systems.

It is often helpful to visualize these challenges. The most common approach is to start from the life cycle of a product, from mining or growing its raw materials to its recycling or waste disposal. Barber et al (2010) expanded this life cycle view with other elements like investments and distribution; and placed values or needs in the center of the diagram:

Figure 1: Consumption and Production systems (Barber, unpublished)



In Figure 1 one can distinguish the life cycle of a product or service, beginning from extraction of its raw materials, to waste. It also includes economic/ financial transactions like investments, and activities like distribution and trade, which are part of the production/ consumption system, but do not qualify as production or consumption themselves. It is interesting that Barber places values/needs in the center of the diagram: the main drivers of the production/ consumption system are our (perceived) needs or wants, driven by our values. Although the visualization in Figure 1 is useful to roughly position production and consumption, it needs further detailing in order to understand better the production and consumption as a system. A further step is depicted in Figure 2, where some of the elements of Figure 1 are specified:

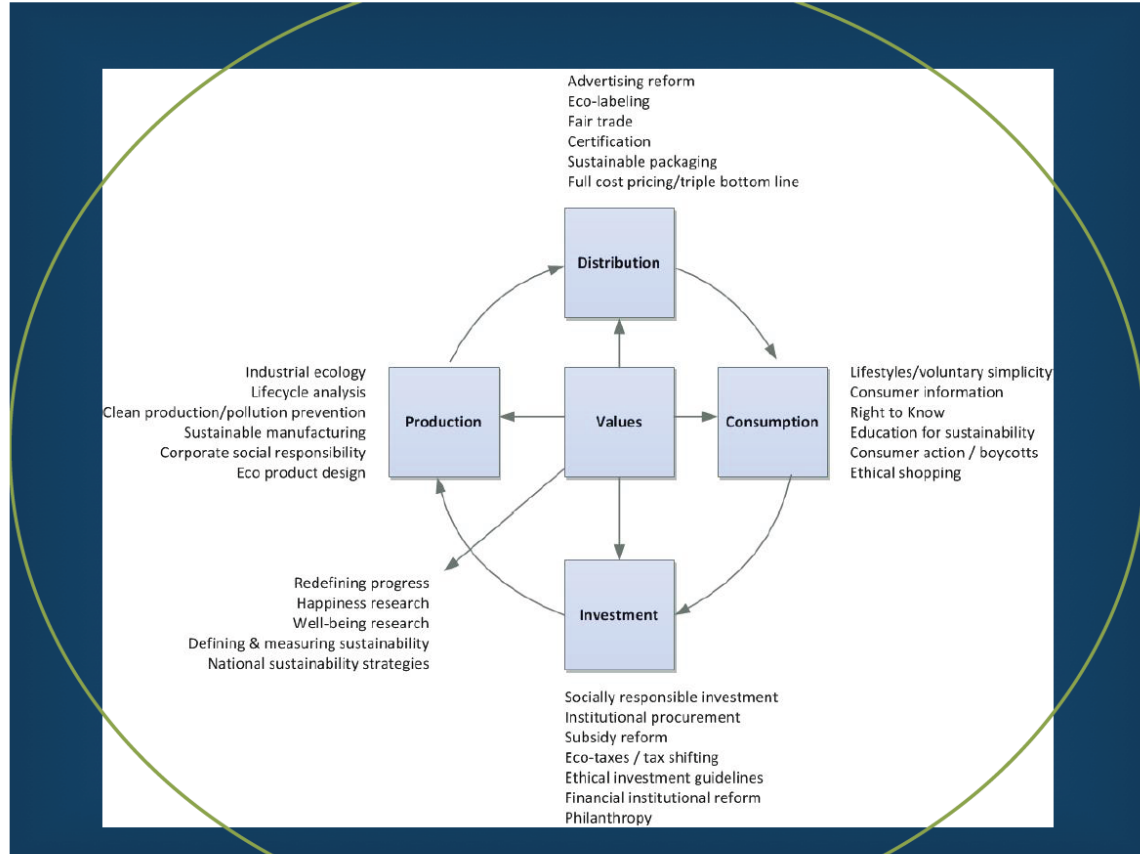


Figure 2 Research and practice in SPaC systems (Barber, 2010)

In Figure 2 one sees an overview of sustainable practices that roughly covers the production-consumption system. Another way of further detailing that system can be achieved by subdividing the activities of Figure 2 along various sectors, regions, and issues (see the cube in Figure 3).

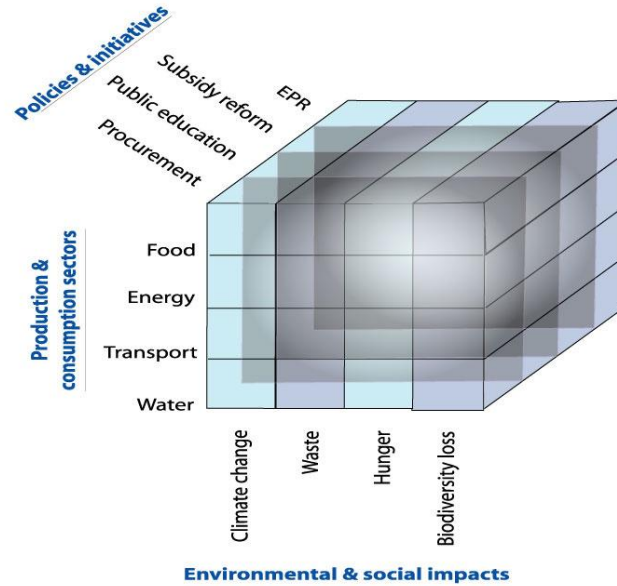


Figure 3. Sectors, Policies, and Impacts (Barber, 2010)

The advantages of Figures 1, 2 and 3 are that they allow detailed analysis of SPaC activities, for instance: research on the climate change aspects of food production in Africa, using life cycle assessment and investment decisions; and including transportation and trade. However, this approach leads also to a rather fragmented view of the field; and it is not very helpful to formulate broader research questions and agendas. A more cross-cutting and unifying approach is necessary to characterize (un)sustainable production and consumption, and to develop a research agenda focusing on systemic change.

In its draft GRF-SPaC ten-year research agenda the main research questions are framed as “..... *how to understand the present lock-in in unsustainable consumerist lifestyles and production patterns, and to understand how a possible transition to more sustainable production and consumption patterns and lifestyles could be accomplished. For quickly developing countries like China, India, and Brazil this question has an even higher degree of urgency, given the rapid emerging of new middle classes with consumerist lifestyles, next to the persistence of deep poverty and growing inequality.*” This framing has two aspects to it: a rather static question (how to understand the persistence of current unsustainabilities); and a dynamic (how to transition towards a more sustainable system).

The present **lock-in aspects** could be analyzed through a variety of lenses:

- A *financial and investment* lens (sunk costs in the present unsustainable infrastructures); current subsidies on unsustainable practices like fossil fuels for electricity generation; current prices that do not reflect the true ecological costs; and the current GDP calculations that do not reflect well-being and societal costs.
- A *cultural* lens: the persistence of dominant consumerist cultures, and the persistence of values that support this culture like respect for property; competition, excellence, and achieving, without counting the ecological costs.
- The *institutional* lens, the ‘rules of the game’ – both ‘formal’ (rules, laws, constitutions) and ‘informal’ (socio-cultural norms of behavior, conventions, self-imposed codes of conduct) – that shape the environment in which production and consumption take place. This lens could analyze the

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4 persistence of institutions, many of those are not focused on sustainability; or are even promoting
5 unsustainability issues.
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- 7 • The *social-psychological* lens, which focuses on people's behaviors and motivations: people are
8 craving for happiness and well-being, but are not always aware that more stuff does not always
9 make them happier; and in addition, people do not like big changes, people are anxious about their
10 own security, and the possibilities for their children to advance in society.
- 11 • A fifth lens could be *power relationships, political systems, and governance systems*. Existing
12 power relationships often depend on economic assets and access to the mass media, and access to
13 the political system; the political and the governance systems are not easily changed, and thus also
14 form a lock-in and a barrier to change.
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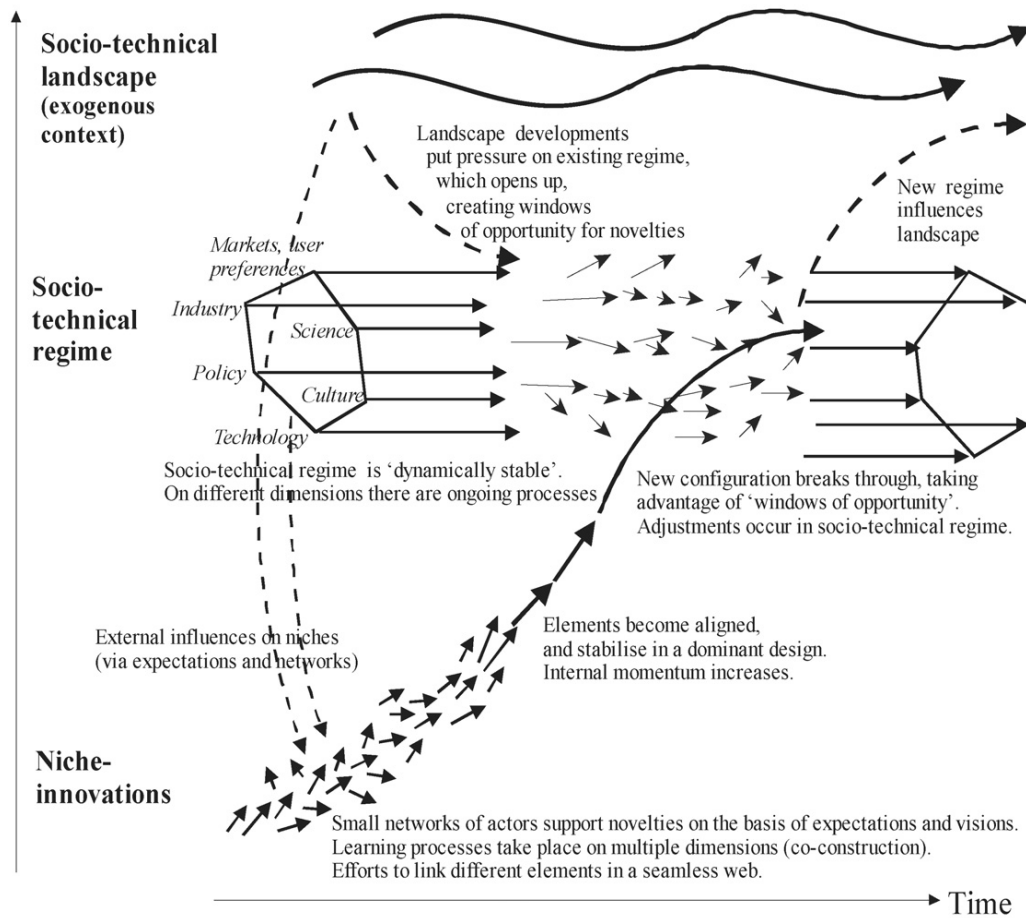
17 2.2 On Systemic Change

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19 Next to the rather static lock-in analysis, we need to reflect on **theories of change**, especially
20 changing the present unsustainable production-consumption system into a more sustainable system.
21 The dominant paradigm is that technological innovations, in combination with suitable policies, will be
22 able to solve ecological problems. However, it is becoming more and more recognized that technology
23 alone will not be able to solve this problem. Technological innovations have the potential to transform
24 society, like the internet; and also have the potential of reducing pollution and enhancing resource
25 efficiency - for instance through dematerialization and through energy efficiency and renewable energy.
26 However, rebound effects (Herring *et al.*, 2008) on many levels are counteracting these efficiencies: on
27 the individual level, if consumers spend their saved expenses on unsustainable activities; and on the
28 economic level, when efficiencies spur innovations in more new products and services (the Jevons
29 paradox) (Alcott, 2005).
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33 Next to efficiency we need a measure of "*sufficiency*": how much is enough? (Princen 2005).
34 Sufficiency needs to be connected to two issues: one is individual and social well-being; and the other is
35 ecological sustainability. Thus a sufficiency lifestyle should on the one hand remain within the ecological
36 footprint that reflect a fair earth share; and on the other hand enhance human and social wellbeing.
37 There are many visions and scenarios for such sustainability lifestyles that reflect sufficiency, for
38 instance the Tellus Institute's Great Transition Scenario (Great Transition Initiative 2013) and the
39 SPREAD project (SPREAD 2013; Mont *et al.*, this issue)). The challenge is not only to develop appealing
40 visions of the future, but especially to develop strategies and policies about how to get there. So far,
41 there is a deficiency in effective strategies and policies.
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44 Here we want to reflect on a few **strategies for systemic change** that have been developed over
45 the last decade or so. The **socio-technical transitions framework** focuses mainly on technological
46 innovations. The framework in essence stipulates that technological and social innovations are
47 developed in niches, where social actors are able to experiment with the design and the implementation
48 of new technologies, social arrangements, and organizational structures (Geels and Schot, 2007). This is
49 shown graphically in Figure 4. An obvious example is the electric car. Once experiments in niches have
50 developed the innovation into a somewhat stable design, the niche may eventually challenge the
51 mainstream, which is called a socio-technical regime (in this case the internal combustion motor
52 regime). The destabilization of the socio-technical regime may be further enhanced when "landscape"
53 developments push in the same direction (for instance the global challenges of climate change). The
54 incumbent regime may eventually be replaced by a more sustainable regime (like steam ships replaced
55 sailing ships 100 years ago).
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Figure 4: Socio-technical transitions (Geels and Schot, 2007)



This is not the place to extensively discuss the benefits of, and the critiques on the socio-technical transitions framework. It has proved to be able to generate a multitude of case studies, and has inspired a generation of researchers to investigate long-term changes and challenges of the incumbent socio-technical paradigm. The framework is somewhat deficient on the economic side; it hardly discusses the economics of transitions. It also does not discuss the issue of growth or degrowth. It is also not very explicit about lifestyles and consumption patterns. However, it is one of the very few frameworks that allow us to think strategically about long-term systemic change; and offers the possibility of directionality into a sustainability transition.

A second framework of systemic change is the perspective of grassroots innovations (Seyfang and Smith, 2007; Seyfang 2009), which is also discussed under the heading of **Bounded Socio-Technical Experiments** (Brown and Vergragt 2008). BSTEs are in essence experiments in alternative technologies and social arrangements in niches: this framework focuses on the social learning processes that take place in those niches. The theory claims that learning occurs when actors with different world views (business, government, civil society, and academia) collaborate in concrete projects, for instance on the design of a sustainable transportation system, or a sustainable city concept. In such collaboration the actors, guided by their different works views, initially develop incompatible problem definitions (profit making; long-term social benefits, social change, knowledge creation). During the project, and especially in the design stage, actors mutually adjust their problem definitions (but not their world views, which are stable), and develop a joint problem definition that guides their collaboration. This development and

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4 stabilization of a common problem definition constitutes higher order learning; and actors can transfer
5 this learning to their subsequent projects.

6 Seyfang and Smith have studied “**grassroots innovations**” existing in the “social economy” of
7 community activities and social enterprise, rather than in the market economy (Seyfang 2009, p 72-73;
8 Seyfang and Smith, 2007). Among their examples are: local currencies, local farmers’ markets, non-
9 traditional housing, and others. The institutional forms of those initiatives are different from market
10 institutions, including cooperatives, voluntary associations, informal community groups, and other social
11 enterprises. They are driven by two motives -- social and environmental needs, and ideology -- and
12 emphasize different social, ethical, and cultural rules and values. Social and environmental needs could
13 for instance consist of access to affordable and sustainable housing, fresh and sustainable food,
14 sustainable transportation services, etc. Ideology refers to “...alternative ways of doing things, counter
15 to the hegemony of the regime.....Some grassroots innovations develop practices based on reordered
16 priorities and alternative values. Examples are for instance the new economics, focusing on the quality
17 of life rather than on economic growth per se” (Seyfang 2009, p 74).

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21 Another framework of systemic change has been developed under the heading of **visioning and**
22 **backcasting** (Quist *et al.* 2011). Backcasting can be defined as “generating a desirable future, and then
23 looking backwards from that future to the present in order to strategize and to plan how it could be
24 achieved” (Vergragt and Quist, 2011). It has gradually become more widely applied over the last decade.
25 This is related to the rising popularity of the strongly normative concept of sustainability. As backcasting
26 is about desirable futures – the futures we would like to get – it has a strongly normative nature too,
27 and therefore it is especially well equipped to be applied to sustainability issues. Backcasting works
28 through envisioning and analyzing sustainable futures and subsequently by developing agendas,
29 strategies and pathways how to get there. Visioning and Backcasting have been used in the SPREAD
30 project, described in this issue by Mont (SPREAD 2013; Mont *et al.* 2013). An interesting, as yet
31 unpublished, new approach is “Systems mapping”, based on an approach developed by Hsueh (2012).
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34 In the sociological literature the concept of “**New social movements**” is relevant (Buechler
35 1990). The most noticeable feature of new social movements is that they are primarily social and
36 cultural and only secondarily, if at all, political. New social movements concentrate on bringing about
37 social mobilization through cultural innovations, development of new life-styles and transformation of
38 identities. They also give rise to a great emphasis on the role of post-material values in contemporary
39 and post-industrial society as opposed to conflicts over material resources. Contemporary social
40 movements are rejections of the materialistic orientation of consumerism by questioning the modern
41 idea that links the pursuit of happiness and success closely to growth, progress and increased
42 productivity and by promoting alternative values and understandings in relation to the social world.
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45 In this Special Issue, the paper by Akenji (2013) offers a useful conceptual model of change,
46 summarized visually in Figure 5. It presents three conditions necessary to shift the system towards
47 sustainability – the right attitudes by all stakeholders (shaped by values and knowledge); facilitators to
48 translate attitudes into action (incentives and constraints); and sustainable infrastructure (including
49 systems of provision and the physical infrastructure).
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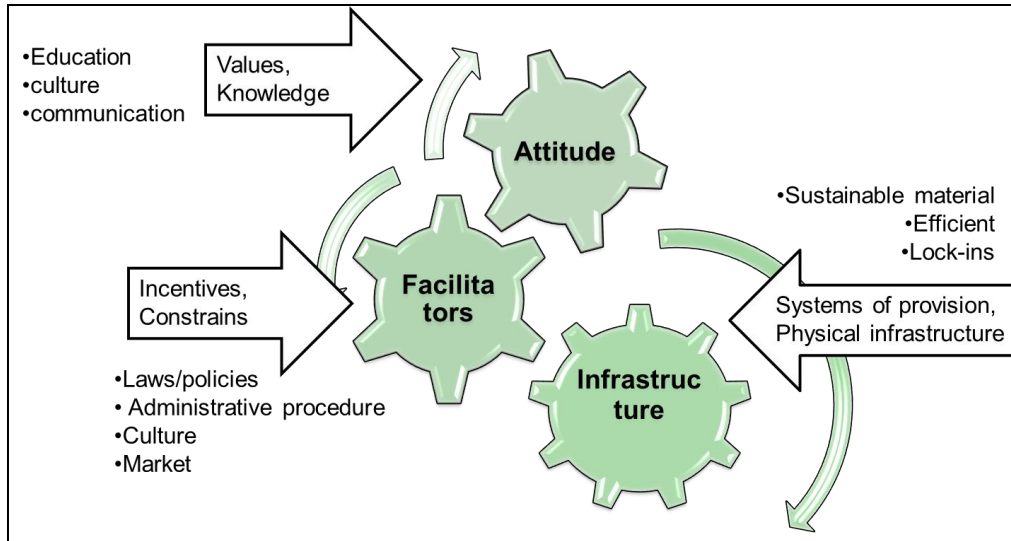


Figure 5: Mainstreaming sustainable consumption (Akenji, this issue)

2.3 Additional perspectives

In addition to the above mentioned approaches to systemic change, there are other useful approaches that are cross-cutting the field of SPaC. One approach to sustainable consumption is the **social practice theory** (Shove *et al.* 2010, Halkier 2013). Social practice scholarship views consumers of goods and services as practitioners immersed in the affairs of everyday life. Practices are the ways that people constitute the ordinary tasks of working, cooking, washing, preparing food, socializing, and relaxing. Moreover, most individuals typically regard themselves as practitioners engaged in the business of living, rather than as consumers of scarce commodities. This approach offers a useful new perspective on consumption practices; it however offers few insights into how to change established consumption practices.

A discussion that touches on sustainable consumption is the **growth-degrowth debate**, which rages both within economics but also in the social movements around SPaC (Schneider *et al.* 2010; Sekulova *et al.* 2013). This debate is closely connected to the efficiency-sufficiency debate. Economic growth (measured in GDP) has since WW2 been the bedrock of economic theories and government policies. Economic growth is supposed to generate employment for most, as well as technological innovations, infrastructure development, and lifting the poor out of poverty. In this context the notions of relative and absolute decoupling have emerged. Relative decoupling is a reduction of energy, materials, and emissions per unit of production, which reduce environmental pollution, but these reductions are often offset by economic growth. Absolute decoupling, on the other hand, refers to an absolute reduction in materials throughput, energy use, and emissions; which in many cases require degrowth. Although successes have been achieved in relative decoupling, absolute decoupling has so far not or hardly been achieved.

In this context, the degrowth movement argues that in (over)developed countries the economy should not grow further in terms of materials throughput, energy use, and GDP; but should shrink in a planned and orderly way, not through recessions and economic calamities (Alperovitz, 2011). Some modeling has been performed on degrowth, which shows that public investments rather than private consumption, in combination with a shortening of the working week, could possibly achieve a degrowth scenario (Victor 2008, 2010).

Degrowth can be considered part of the New Economy movement, which has a macro - economic component (Harris, 2013; Røpke, 2013) (degrowth of the economy and different indicators for human and economic wellbeing than GDP); but it has also a grassroots innovation component as it concentrates on social and technical experiments, alternative currencies, experiments like transition towns, and different forms of company ownership like cooperatives

In a recent book, based on the 2nd SCORAI workshop in 2011, three research traditions have been brought together: socio-technical transitions, new economics, and theories of practice (Cohen *et al.*, 2013). This book shows that the deficiencies in each of these theoretical approaches can be, to a certain extent, be compensated by the other approaches. Jointly they cover to a large extent the sustainable consumption field. In this book this has been exemplified by a chapter on passive houses, investigated through the “lenses” of these three theoretical approaches (Brown *et al.*, 2013).

Summarizing thus far, it is clear that conceptualizing and researching a transition to a sustainable production and consumption system is a very challenging task. It is often not clear where research ends and social practices and policies begin. It is clear that the research field is not yet very well structured, and that its boundaries are still fluid; all are manifestations of a pre-paradigmatic phase. This introduction tries to sketch some lines through this emerging research field.

From a practitioners and policy point of view, somewhat more progress has been made. In the last 30-40 years, environmental policies have focused on cleaner production (Almeida *et al.* 2013), sustainable design, materials and energy efficiency, and increasing on sustainable consumption and the propagation of sustainable life styles. Lebel and Lorek (2008) produced a useful overview and consolidated most of these practices in the following overview of “enabling mechanisms”:

Table 1: Lebel and Lorek ‘Enabling mechanisms’ (2008)

Enabling mechanism	Short description	Concerns, constraints or challenges
Produce with less	Innovations in production process reduce the environmental impact per unit made	Rebound effects
Green supply chains	Firms with leverage in a chain impose standards on their suppliers to improve environmental performance	Unfair control of small producers
Co-design	Consumers are involved in design of products to meet functions with less environmental impact	Inadequate incentives for firms to involve consumers
Produce responsibly	Producers are made responsible for waste from the disposal of products at the end of their life	Incentives for compliance without regulation may be low for many types of products
Service rather than sell	Producers provide service rather than sell products , this reduces the number of products made while still providing to consumers the functions they need	Difficult transition for firm and consumer to make as it requires new behaviours and values
Certify and label	Consumers buy labelled products. As labels are based on independent certification, producers with good practices increase their market share	Consumers easily confused with too much information or lack of transparency & credibility of competing schemes
Trade fairly	Agreements are made with producers	Mainstream trade still dominates.

	that may include minimum price and other investments or benefits. Consumers buy products labeled as or sold through fair trade channels while producers get a better deal.	Hard to maintain fair trade benefits to producers when product becomes mainstream.
Market ethically	Reducing unethical practices in marketing and advertising would reduce wasteful and over-consumption practices.	Reluctance by policy-makers to tackle very powerful private sector interests with regulation.
Buy responsibly	Campaigns that educate consumers about impacts of individual products, classes of products and consumption patterns change behaviour overall.	Converting intentions and values into actions in everyday life is often difficult for consumers. Issues of convenience, flexibility and function still matter a lot.
Use less	Consumption may be reduced for a variety of reasons, for example, as a consequence of working less. There are many potential environmental gains from less overall consumption.	Dominant perception that using less means sacrifice. Less income and consumption may not automatically translate into better consumption impacts.
Increase wisely	Increasing consumption of under-consumers can be done in ways that minimize environmental impacts as economic activity expands.	Incentives for developed countries and firms to assist those in developing may be inadequate.

This overview focuses mainly on producers, governments, and consumers as actors. Each of these enabling mechanisms suggests a number of research questions, such as: how effective has this mechanism been in practice; what has been learned; how to compare countries, sectors, and approaches with each other; how have the concerns mentioned in the second column been addressed, and by whom? And how effective have these attempts been?

In Table 2 we organize the main research directions in SPaC research; this overview is created by studying the main subject issues in recent papers, books, and conferences. Every overview has its biases and its flaws; and the complex system that SPaC is can be represented in many different ways. We use this table in two ways: to map the SPaC research field in general; and to position the papers in this special issue (some papers appear in more than one category):

Table 2: Main research areas in the SPaC research field:

Research area	Main topics	Main topics	Papers in this Special Issue
1	Systemic change	Visioning and backcasting	Mont <i>et al.</i>
		Socio-technical transitions	
		Attitudes-facilitators-infrastructure (AFI) framework	Akenji
		New Economy	
		Solidarity economy; economic democracy	
2	Macro approaches	Scenarios; forecasting	

		Trend analysis	Brizga <i>et al.</i>
		Macro modelling	
		Economic growth vs. degrowth	Juknys <i>et al.</i> ; Lorek and Spangenberg
		Cultural analysis	
		Post-consumerism trends	
3	Production, technology, design	Life cycle assessment Cleaner production Industrial ecology Materials Flow Analysis Eco-design Design for sustainability	
4	Business, innovation, and marketing	Green supply chain management	
		Choice editing	Akenji
		Green marketing	Echegaray
		Product service-systems	
		Fair trade	Ariztia <i>et al.</i>
		Sustainability reporting	
		New forms of business ownership (coops)	Smith <i>et al.</i>
5	Governance, policies, politics	Sustainable procurement	Ariztia <i>et al.</i>
		Eco-labelling	Dendler; Echegaray
		Regulations, incentives, information	Schroeder
		Political consumerism	Ariztia <i>et al.</i> ; Barbosa <i>et al.</i>
		Leadership	Vinkhuyzen and Vinkhuyzen
6	Civil society	Grassroots innovations	Smith <i>et al.</i>
		Bounded socio-technical experiments (BSTEs)	
		Collaborative consumption	
		Stakeholder analysis	Echegaray
		NGOs and social movements	Schroeder
		Education	
7	Equity	Poverty eradication	Lorek <i>et al.</i>
		Inequality in income and wealth	
		Sustainable Livelihoods	
		Fair Earthshare	
8	Final consumption	Shopping	
		Theories of practice	
		Wellbeing and happiness	
		Sustainable lifestyles	Mont <i>et al.</i>
		Collaborative consumption	
		Shortening of the working week	

		Consumer behaviour	Wang <i>et al.</i> , Zhao <i>et al.</i> ; Veloso and Barbosa; Blumberga <i>et al.</i> ; Anantharaman
		Values	
		Sufficiency	
9	Mapping progress	Metrics, indicators of progress	
		Mapping the movement	
		Alternatives to GDP; well-being indicators	

Academic disciplines that cover these research fields range from psychology, sociology, anthropology, philosophy, to innovation studies, science, technology and society (STS) studies, well-being studies, and many others. Most research questions, however, require an interdisciplinary or even transdisciplinary approach.

3. Papers in this special issue

In this special issue the selected papers obviously do not cover all categories of table 2. Still, at the Rio (2012) workshop a remarkable coherence was reached. The workshop papers were at that workshop clustered in the following categories: Southern perspectives (keynote); Long-term visions and trends; Inclusive economy (Keynote); Green innovation; Green economy or degrowth?; Grassroots innovations (keynote); lifestyles; culture; policy; education; and mapping knowledge, practice, and leadership. Not all workshop papers could be accepted for this special issue; for a complete overview of all papers see the workshop report (Lorek et al, 2013) and the website <http://grfscp.wordpress.com/> where all papers and presentations are collected. Some papers will appear as GRF-SPaC working papers.

Below follows an overview of the papers in this special issue. We organized the papers close to, but not entirely coinciding with, the scheme of table 2. Each of the sections, which consist of 2-4 papers, is followed by a selected set of open research questions. This section is followed by section 4: *reflections and further research*.

3.1 Systemic change

Akenji taps into the discursive confusion over sustainable consumption, analyzing and highlighting critical differences between green consumerism and sustainable consumption. Green consumerism is the dominant policy approach, but Akenji argues that it is insufficient and often at odds with sustainable consumption. He then expands the concept of consumption beyond just the individual or households – questioning assumptions often built into policies that attempt to address unsustainable consumption. To avoid “consumer scapegoatism” and to go beyond green consumerism, Akenji develops an AFI framework – Attitude, of stakeholders; Facilitators, to reflect attitudes; Infrastructure, to facilitate sustainable lifestyles - to use in designing policies for sustainable consumption. Stemming from his analysis are four examples of policy approaches that together can shift society beyond green consumerism targeting choice editing, measuring sustainable progress, encouraging grassroots innovation and introducing environmental limits. He then highlights the crucial role of science and research not only in helping policy makers understand the implications of unsustainable consumption but also in setting and effective targets for consumption to stay within ecological limits while enabling shared prosperity.

Mont et al. focus on the role of stakeholder visions and emerging practices social innovation in enabling sustainable lifestyles and the role of research in shaping more sustainable ways of living in 2050. Four visions of a 2050 'sustainable lifestyle' (defined as 8 tons of total material consumption per person per year) are developed and a backcasting methodology involving participants from business, research, policy and civil society is used to explore the diverse ways in which they could evolve. Leverage points are identified for enabling the transition to sustainable lifestyles in 2050, including the development of policy, provision of infrastructure, alternative business models and community empowerment. To facilitate this transition, Mont *et al.* call for more interdisciplinary (social and technical science), inclusive (practitioners, business and consumers), and long-term oriented research. Scenarios and backcasting offer such opportunities and are valuable in focusing attention on future visions rather than on present day challenges; but Mont *et al.* highlight the need for innovation policy to encourage more society-wide experimentation toward sustainable lifestyles.

Open questions: is it possible to model, or even fully conceptualize a system; how to initiate change within the established system; how to account for unintended consequences of system interventions; how to synchronize interventions from various perspectives; which theory of change is best suited for sustainability transitions; how to recognize early signs of a transition; what is the role of business, civil society, governments, leaders in such a transition; how to quantify and validate research outcomes?

3.2 Macro approaches: growth vs. degrowth

Lorek and Spangenberg criticize the current 'green economy' or 'green growth' agenda as being insufficient and potentially counter-productive to the long-term goal of sustainability because of their reliance on 'weak sustainability' stimuli. They argue that institutional change that promotes "strong sustainable consumption" is a necessary condition for sustainable development and call for the greater involvement of government and "powerful" actors in encouraging public debate. But Lorek et al reserve their main recommendations for civil society engagement. They criticize some NGOs for weakening perspectives on sustainability and co-operating too closely with the (more conservative) government and business organizations. The authors encourage NGOs instead to interpret their work in a broader (more systemic) perspective, to widen their sources of finance and to shape members "value sets" toward more intrinsic motivation through better leadership, to initiate and catalyze grassroots networks and to work more closely with academia.

Brizga et al. assess the progress of Eastern European countries toward sustainable consumption and production. The Eastern European countries are particularly interesting to observe because of the structural changes over the last 20 years that have led to higher economic growth, more consumption and production and increased environmental pressures. Brizga et al combine a statistical analysis of SCP trends with expert interviews about ongoing processes. The analysis reveals that although SCP is widely unknown, many socio-economic development policies are consistent with SCP. However, many of these are unenforced and/or fragmented and contradictory. Moreover, policy effectiveness is difficult to measure because of weak environmental monitoring systems. The authors conclude that EU policy influence is necessary but not sufficient, and that national SCP policy development and stricter regulation is needed also.

Juknys et al. provide a background to the on-going debate about economic growth and sustainability. By distinguishing between the trends seen in developed and developing countries, Juknys et al critique the notion of a one-size-fits-all strategy of de-growth. They point to decelerated economic growth in developed countries over the last half century. How then should developed countries reduce their ecological footprint without resorting to strategies of "radical degrowth"? The authors argue the most promising avenues lie with de-fossilization (increased energy efficiency, increased use of renewable resources) and de-materialization (reduce, re-use, recycle). Further deceleration, coupled with a lower

ecological footprint, in developed countries would allow accelerated economic growth in developing countries – the empirical focus of Juknys *et al*'s paper – enabling socio-economic catch-up with developed countries. The authors remain hopeful that this development can be achieved with lower environmental impacts because of the “traditions and habits of a leaner life” experienced by citizens in developing countries.

Open questions: How to manage growth in developing and transitional countries such that it does not lead to “overshoot” into overconsumption; is there a “sustainable path” leading from underdevelopment to sustainable development without mimicking the consumerist societies; how to manage alternatives in an ocean of consumerist culture; how could mass-media and social media be harnessed for this; how to protect emerging economies and citizens from pressures of unsustainable economic growth and consumerism driven by traditional Western dominated institutions and norms?

3.3 Governance and Government policies

Schroeder considers SCP governance in China and the relative effectiveness of top-down and bottom-up approaches for both enabling and restricting more sustainable and unsustainable consumption and production. Based on interviews with Chinese and foreign experts he illustrates that top-down approaches are considered to be relatively more effective and discusses examples such as the subsidy programs for stimulating the uptake of energy efficient appliances, and restrictions on car use in major cities. In his discussion, Schroeder notes that both policies could have been more successful, for example, the former hindered by more absolute consumption of appliances, the latter by contradictory policy initiatives subsidizing the purchase of private vehicles.. Examples of initiatives promoting sustainable urban commuting and changing farming practices demonstrate that there is a role for bottom-up approaches also, especially in rural areas where communities are stronger. Overall, the study evidences an “insufficient” governance system for SCP in China, and Schroeder calls, in particular, for more bottom-up governance initiatives to encourage voluntary sustainable consumption choices and behavioral changes.

Dendler tackles what has been repeatedly discussed as a shortcoming of the prominent governance instrument of product labeling– the confusion amongst the public created by a plethora of product information schemes- and considers the inherent challenges in establishing a sustainability meta-labeling scheme (SML) to address this shortcoming. Analysis of the dynamic and complex legitimacy construction process of four product labeling case studies reveals a cluster of “institutional logics” that she uses to explore the potential effectiveness of a SML. Echoing Echegaray’s findings below, Dendler concludes that consequential legitimacy (i.e. demonstrating positive outcomes, above and beyond the status quo) presents the dominant challenge for standard setting, assessment and communication of a SML but that procedural legitimacy (i.e. participation, inclusiveness) is also an important consideration, particularly given the diversity of actors involved and the existing contestations around the notion of Sustainable Development. Whereas Echegaray maps an incremental evolution for existing labeling schemes, Dendler’s work emphasizes that creating institutional mechanisms to enable more sustainable production and consumption can be a highly complex, dynamic and contested process.

Open questions: who are the key governance actors in supporting the institutionalization of SCP initiatives; How to develop and implement long-term transformational policies/strategies in short-term political cycles; how to initiate change within the constraints of traditional governance models; how to shift government imperative from immediate economic interests to long-term transformational progress?

3.4 Political Consumerism and Leadership

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4 **Ariztia et al.** analyze ethical consumption in Brazil and Chile. They state that ethical consumption
5 practices are mediated by institutional frames of organizations that promote ethical consumption
6 practices; and are situated in specific local institutional contexts: civil society (especially NGOs), markets
7 (especially CSR), and governments (especially procurement). We see emerging ethical consumption in
8 both Chile and Brazil but these are shaped differently by the interaction between actors from civil
9 society, markets and government domains. In Chile, ethical consumption is driven mainly by (overseas)
10 market forces and dominant actors are large producers, responding to the demands of (overseas)
11 customers and consumers. In contrast, in Brazil, the state has played a central role in promoting ethical
12 consumption practices, especially through public procurement and legislation. The case study highlights
13 the inter-related role of various actors to stimulate change to more sustainable production and
14 consumption, and the sometimes antagonistic, sometimes synergistic, interplay that emerges in
15 different institutional contexts.
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19 **Barbosa et al.** investigate the extent to which political consumerism shapes consumption behavior in
20 Brazil. Focusing on young urban people – those who have “grown up in a context where environmental
21 concerns....[are associated with] lifestyles and consumption choices” – the authors explore the
22 relationship between their consumption practices/discourses and values of political consumerism.
23 Through conducting an extensive survey the authors present evidence that despite high awareness,
24 young urban Brazilians have little individual involvement in regular acts of political consumerism (e.g.
25 boycotts, buycotts, petitions). Instead, consumer organizations collectively represent the interests of
26 individuals. Individual action is hindered by the ‘tragedy of the commons’, manifest in a strong Latin
27 American cultural tradition where only collective action is deemed effective. Interestingly, Barbosa et
28 al.’s findings suggest that family values remain the dominant institutional influence on young peoples’
29 consumption behavior. Generally speaking, in an age when young people are living longer at home, this
30 arguably delays opportunities for political consumerism to flourish.
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34 **Vinkhuyzen and Vinkhuyzen** acknowledge the role of formal and informal institutions to shape behavior
35 but focus on the role of individuals within organizations, their attitudes, skills and capabilities.
36 Vinkhuyzen et al. argue that in more systemic analyses of sustainable production and consumption the
37 individual’s purpose, style and motivation of leadership tends to get overlooked. The authors review
38 alternative leadership models with respect to the challenges of sustainable production and consumption
39 – uncertainty, complexity and long-termism – and argue that the ‘Moral leadership Framework’ (MLF) of
40 Anello (1997) best encompasses the purpose, style and motivation of leaders to stimulate change in
41 others. More empirical support is needed to evidence this new stream of research, but one can find
42 characteristics of the MLF in the work of others e.g. see Anantharaman below.
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45 **Open questions:** what is the role of various stakeholders, and what empirical evidence exists for
46 effective leaders in government, business, and civil society in transitions towards more sustainable
47 lifestyles and institutions; what are contextual and cultural variations in stakeholder engagement in
48 change processes; what are linkages to grassroots innovation and social movements; how to “politicize”
49 consumption on a much larger scale, i.e. raising awareness with consumers, the educational system,
50 social institutions about the political dimensions of consumerism.
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52 **3.5 Grassroots innovations and Stakeholder involvement**

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54 **Smith et al.** study processes of grassroots innovations in Latin America, especially Brazil, comparing
55 them with the appropriate technology movement in the 1970s. Grassroots innovations rarely feature in
56 innovation policy design, and yet they provide spaces for knowledge production relevant to policy
57 makers. There are many common characteristics; and the study reveals three contradictions: the tension
58 between locally constructed and adapted and wide replication; the challenge that these socio-technical
59 constellations are adapted to, yet seek to transform local situations; and the tension being project based
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yet seeking structural changes. They also reflect on knowledge production in grassroots innovation movements: the first tension, framed as grassroots ingenuity, produced ethnographic knowledge; the second, framed as empowering inclusion, produces instrumental knowledge; and the third, framed as structural critique, produces critical knowledge. The production of these three types of knowledge contributes to a better understanding of innovation processes at the grassroots level and offers innovation policy makers the opportunity to reflect more broadly, more inclusively, on shaping technological and social futures.

Echegaray investigates stakeholder perceptions of solar photovoltaic (SPV) energy in Brazil, both with consumers and business. The study reveals challenges to SPV are low awareness, misperceptions and insufficient communication. Echegaray draws attention to the limitations of eco-labels in addressing these challenges and focuses on the effectiveness of market research in revealing preferences and steering promotion efforts of sustainable technologies. User-input into the design process of labels is highlighted, so too third party support and independent verification of more sustainable outcomes. In addition, greater efforts to educate the public are needed, Echegaray argues, to legitimize a transition to a more sustainable energy supply.

Open questions: Could grassroots innovations, or, more broadly, economic democracy spread through civil society activism? How could such movements help to raise awareness and mainstream sustainable technologies; how to evaluate suitability of up-scaling or replication of success cases?

3.6 Consumer behavior: modeling, surveys, and qualitative analyses

Blumerga et al. modeled energy consumption in the residential building sector in Latvia, and explore the formal role of government in stimulating the adoption and diffusion of insulation. Their underlying micro-economic approach reminds us of the socially embedded and socially constructed nature of the market for domestic energy efficiency and unpacks the multi-faceted role of government to address the costs and benefits experienced by householders. This includes not only upfront investment but also uncertainty costs associated with poor construction work, making agreements with others in multi-occupancy buildings, etc. Simulating the effects of current policy reveal threshold effects associated with supply side bottlenecks and a slowing rate of diffusion following the end of policy interventions. The analysis adds value in highlighting the effects of timing for effective government intervention.

Zhao et al. analyze the sustainable consumption behavior of rural residents in China. Based on a large questionnaire they find that the overall sustainable consumption behavior is low, and is influenced by knowledge, behavioral intent, and economic motives; and also by enabling factors like infrastructure (e.g. sewage treatment facility, refuse collection system), a supportive environment and greater supply of sustainable products. Recommendations stemming from the analysis include education initiatives in rural areas to inform and empower residents and more joined-up sustainable consumption policies across government.

Yuan Wang et al. also analyze consumer behavior in China, but focus on residents in the urban metropolitan area of Qingdao. They develop a theoretical framework to determine the effect on green consumer behavior of personal influence, knowledge, attitudes, internal and external moderators; and explore whether these effects differ among purchasing, using, and recycling behaviors. Similar to Wang et al.'s findings for rural residents, Yuan Wang et al. find that urban residents engage in green consumer behavior for personal (e.g. economic) reasons rather than collective (environmental) reasons. The regression analysis also indicates that attitudes positively influence buying, while income and perceived consumer effectiveness determines using.

Veloso and Barbosa focus on domestic life in Brazil and the gap between what people say about sustainability and their everyday practices. They investigate the awareness of sustainability challenges,

and the meanings among consumers of cleanliness, freshness in food preparation, and the use of electric appliances. Their conclusion is that many habits are taken for granted and have negative impacts on the environment. Inertia in these habits stems from their association with moral valuations (e.g. the “good housewife”) and signs of distinction (e.g. more clean = less poor).

Anantharaman provides us some ethnographic insight into the collective role of new ‘middle class’ residents in Bangalore, India. To some extent, these “environmentally conscious, socio-economic privileged” residents exemplify the notion of leadership discussed by Vinkhuyzen and Vinkhuyzen. In her description of their actions, Anantharaman highlights how the residents demonstrate some aspects of moral leadership in the way that they serve the common good, promote personal and collective change through invoking environmental discourses and creating new social norms, infrastructures and mechanisms that assist social transformation. She reveals also how this would not be possible without the support of others within and beyond the resident’s homes, who through their livelihood practices (cleaners, municipal waste collectors) play a critical role in producing the systems that make pro-environmental behavior possible. This socio-inclusive approach begs questions about how to learn from these cases and replicate their findings across the expanding middle classes of developing countries.

Open questions: how can lessons from emerging Indian middle classes and their limited awareness of some environmental issues be used for analyzing potentialities of grassroots innovations in middle class consumer behavior? How can governments stimulate and then sustain the adoption and diffusion of technologies that have both environmental and social benefits; how can producers of everyday goods and services best take account of consumer practices in their sustainable new product development processes; what is the role of civil society and the media in helping change consumers’ ingrained habits.

4. Reflections and further research:

This Special Issue reflects the diversity in the SPaC research field. Because of its global scope, it also highlights regional differences between various areas of the world, in particular how the stage of a country’s economic development matters. It further illustrates the multiple perspectives on the question of how to analyze the present production and consumption system, and how to conceptualize (systemic) change. Research over the last decades actually has revealed a lot of the mechanisms and lock-ins of unsustainable production and consumption, and the barriers to systemic change.

In the field of technology and production a lot of progress has been reached, especially through government policies that curb emissions through regulations, levies, and communication and branding. Companies have increasingly internalized sustainability to the point that it often becomes part of their core business values and operations. However, below the glossy surface of sustainability reports much still needs to be addressed. On a deeper level, companies are still driven by the profit motive, and by their institutional shareholders that look at profits on the ultra-short term; and ultimately, by the greediness of the actors on the financial markets. As long as that system is in place, companies will externalize environmental costs, produce more and more stuff that they try to sell to consumers; and operate as if sustainability science does not exist. It is hopeful that there seems to be an upsurge of B-companies, cooperatives, and other forms of non-shareholder ownership (Kelly 2012), which ultimately could undermine this mechanism. However, governments are often misinformed and support the existing business practices under the guise of “growth”, employment, and wellbeing for all. Part of the dynamics of the degrowth movement is to deconstruct these myths, but a lot needs to be investigated, and viable alternatives are not easily imagined, let alone achieved.

In the field of understanding and changing engrained consumption habits and consumerist lifestyles, we have hardly scratched the surface. For a long time governments have shied away for addressing consumption, partially it would be perceived as overly heavy-handed interference in people’s

private lives. “Consumer sovereignty” still rules; and consumption has taken the place from notions as community, citizenship, responsibility, social capital, and the like. We now know that we cannot change enough by addressing individual consumers, and that giving them information is woefully inadequate. We now know that we should reach the consumer emotionally, but this is an even more individualistic approach, that cannot change the system. Sustainable consumption is often seen as “reducing consumption”, which is obviously not popular.

It is fortuitous that there are a lot of citizens who take responsibility with experimentation of different lifestyles, less motorized transport, small but conformable houses, eating sustainable food, investing in sustainable investment opportunities; but is this enough. The question of mainstreaming is not so loud in this special issue; but it lingers below many of the papers. How could governments mobilize more support for their sustainability strategies, without being voted out of office at the next elections? How could prosumers’ self-organization scale up without losing its sustainability edge? (Smith 2007). Could a social movement be envisaged that aims at peoples’ long-term wellbeing, equity, and sustainability without splintering in manifold different issue organizations? How to find the right language to frame the issues in a way that speaks to a majority of people? How to use the educational system, the mass media and the social media in a way that supports the movement towards sustainability?

All these questions are more trans-scientific than scientific. What we need is not only a lot of research into all the details of SPC research arena; but we also need bold thinking that addresses these transdisciplinary and even trans-scientific questions. The present Special Issue and the people behind it have made a start; and we invite you all to join the effort: by writing papers, attending workshop and conferences, contacting us, or otherwise.

References

Akenji, L. (2013) *Consumer scapegoatism and limits to green consumerism*, Journal of Cleaner Production, this issue.

Alcott, B. (2005) *Jevons' paradox*. Ecological Economics 54 (1): 9–21

Almeida, C.M.V.B., S.H. Bonilla, B.F. Giannetti, D. Huisingh, *Cleaner Production initiatives and challenges for a sustainable world: an introduction to this special issue*, Journal of Cleaner Production 47 (2013) 1-10.

Alperovitz, G. *The New Economy Movement*, The Nation June 13, 2011

<http://www.thenation.com/article/160949/new-economy-movement#> (latest accessed Sept 6, 2013)

Barber, Jeffrey (2010) *Still Waiting for Delivery: A Review of Progress and Programs in the 10-Year Framework*. Prepared for the International Coalition for Sustainable Production and Consumption. Integrative Strategies Forum, Silver Spring, MD. <http://icspac.net/documents/StillWaiting5.pdf> (latest accessed Sept 6, 2013)

Brown H.S., Vergragt P.J., (2008) *Bounded Socio-Technical Experiments as Agents of Systemic Change: The Case of a Zero-Energy Residential Building*, Technological Forecasting and Social Change 75, 107-130.

Brown, H.S., P. J. Vergragt, M. Cohen (2013) *Societal innovation in a constrained world: theoretical and empirical perspectives*, chapter 1 of M. Cohen, H. Brown, and P. Vergragt, eds. (2013) *Innovations in Sustainable Consumption: New Economics, Socio-technical Transitions, and Social Practices*. Northampton, MA: Edward Elgar pp. 1-27.

1
2
3
4 Buechler, S.M. (1990) *Social Movements in Advanced Capitalism*, Oxford University Press, 1999, [ISBN 0-19-512604-1](#)

5
6
7 Cohen M., H. Brown, and P. Vergragt, eds. 2013 *Innovations in Sustainable Consumption: New Economics, Socio-technical Transitions, and Social Practices*. Northampton, MA: Edward Elgar

8
9
10 Geels, F. and J. Schot 2007. *Typology of Sociotechnical Transition Pathways*. Research Policy 36: 399-417.
11 Great Transition Initiative

12
13 Great Transition Initiative <http://gtinitiative.org> (latest accessed Sept 6, 2013)

14
15 Halkier, B. (2013) *Sustainable lifestyles in a new economy: a practice theoretical perspective on change behavior campaigns and sustainability issues*, chapter 10 in M. Cohen, H. Brown, and P. Vergragt, eds. (2013) *Innovations in Sustainable Consumption: New Economics, Socio-technical Transitions, and Social Practices*. pp1-27 Northampton, MA: Edward Elgar pp 209-228.

16
17
18
19
20 Harris, J. (2013) *The macroeconomics of development without throughput growth*, chapter 2 in Cohen M., H. Brown, and P. Vergragt, eds. (2013) *Innovations in Sustainable Consumption: New Economics, Socio-technical Transitions, and Social Practices*. Northampton, MA: Edward Elgar pp 31-47.

21
22
23
24 Herring, H. and S. Sorrell, editors. *Energy Efficiency and Sustainable Consumption: The Rebound Effect*. Palgrave Macmillan 2008

25
26
27 Hsueh, J. (2012) *Systemic Change Process Map*, MIT Sloan School of Management

28
29 Kelly, M. (2012) *Owning our future: The emerging ownership revolution; Journals to a Generative Economy*, Berrett Koehler Publishers Inc., San Francisco

30
31
32 Lebel, L., and S. Lorek (2008) *Enabling Sustainable Production-Consumption Systems*, Annual Review of Environment and Resources 33 (2008) 241-275

33
34
35 Lorek, S., J. Barber, K. Onthank (eds.) (2013) *Global and Regional Research on Sustainable Consumption and Production Systems: Achievements, Challenges and Dialogues*. Workshop Report of the Global Research Forum on Sustainable Production and Consumption. June 13-15, 2012, Rio de Janeiro.

36
37
38 Princen, T. *The Logic of Sufficiency* MIT Press, 2005, 401pp, ISBN: 026266190X

39
40
41
42 Quist, J., W. Thissen, P. J. Vergragt (2011), *The Impact and Spin-off of Participatory Backcasting: from Vision to Niche*, Technological Forecasting and Social Change 78 (5), pp. 883-897

43
44
45 Røpke, I. *Ecological macroeconomics: implications for the role of consumer-citizens*, Chapter 3 in Cohen M., H. Brown, and P. Vergragt, eds. (2013) *Innovations in Sustainable Consumption: New Economics, Socio-technical Transitions, and Social Practices*. Northampton, MA: Edward Elgar pp 48-64.

46
47
48
49
50 Schneider, F., Kallis, G., Martinez-Alier, J., (2010) *Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue*. Journal of Cleaner Production 18 (6), 511–518.

51
52
53 Sekulova, F., G. Kallis, B. Rodríguez-Labajos, F.Schneider *Degrowth: from theory to practice* Journal of Cleaner Production, 38 (2013) 1-6

54
55
56 Seyfang, G., and A. Smith (2007) *Grassroots Innovations for Sustainable development: Towards a new research and Policy Agenda*, Environmental Politics 16(4) 584-603

57
58
59
60
61
62
63
64
65 Seyfang, G. (2009) *The New Economics of Sustainable Consumption: Seeds of Change*, Palgrave MacMillan, 2009

1
2
3
4 Shove, E., and G. Walker (2010) *Governing transitions in the sustainability of everyday life*, Research
5 Policy 39(4) 471-6
6

7 Smith, A. *Translating Sustainabilities Between Green Niches and Socio-technical Regimes*. Technology
8 Analysis and Strategic Management 19 (2007) 427-450.
9

10 SPREAD project <http://www.sustainable-lifestyles.eu/publications/publications.html> (last accessed Sept
11 6th, 2013)
12

13 United Nations (1994) *General Discussion on Progress in the Implementation of Agenda 21, Focusing on*
14 *the Cross-Sectoral Components of Agenda 21 and the Critical Elements of Sustainability*, E/CN,
15 17/1994/14, Appendix, Summary Report: *The Symposium on Sustainable Consumption*. New York.
16

17 Vergragt, P. J, and J.N. Quist (2011): *Backcasting for Sustainability: Introduction to a special issue*,
18 *Technological Forecasting and Social Change*, 78 (5), pp. 747-755
19

20 Victor, P.A. *Managing without Growth: Slower by Design, Not Disaster* (Edward Elgar, 2008).
21

22 Victor, P.A. *Questioning economic growth*, 468 (18 Nov 2010) 370-371
23

24 <http://www.web.ca/~bthomson/degrowth/peter-victor-na-nature-11.pdf> (latest accessed Sept 6, 2013)
25
26
27
28
29
30
31
32
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34
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